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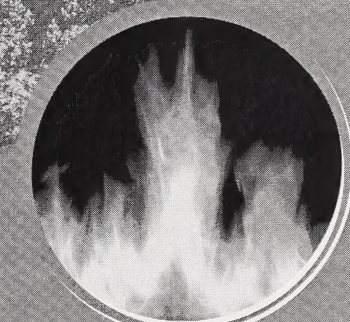
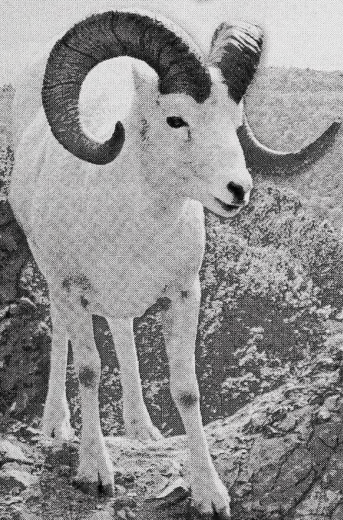
SCIENCE 9

Module

2

Matter and Chemical Change

*Home Instructor's Guide
and Assignment Booklet 2B*



Learning
Technologies
Branch

Alberta
LEARNING

Science 9
Module 2: Matter and Chemical Change
Home Instructor's Guide and Assignment Booklet 2B
Learning Technologies Branch
ISBN 0-7741-2577-2

Cover Art: middle right: Corbis
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The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Home Instructor's Guide and Assignment Booklet.

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



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- Alberta Learning, <http://www.learning.gov.ab.ca>
- Learning Technologies Branch, <http://www.learning.gov.ab.ca/ltb>
- Learning Resources Centre, <http://www.lrc.learning.gov.ab.ca>

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Section 3: Characteristics of Chemical Reactions

In this section the student concentrates on chemical reactions. The student looks at chemical reactions that release heat energy and others that absorb heat energy. The student uses a kind of shorthand—chemical equations—to represent reactions. The student investigates factors that affect the speed of reactions. Many of the reactions studied are common to the student's everyday world.

The following materials will be needed to complete this section.

Section 3: Lesson 1

A teacher-supervised laboratory in school is recommended for “Find Out Activity: Is It a Chemical Reaction?” If students are going to the lab for the activity, check with the course teacher for the materials needed. If students are not using the lab, the following list applies.

- a 250-mL measuring cup
- a 5-mL spoon or a teaspoon
- a commercial antacid tablet
- a candle
- a candleholder
- a cooking stove or a hot plate
- a drinking glass
- matches
- a metal cooking pot
- frozen, flavoured water
- a stirring rod or a spoon
- sugar
- a small, self-sealing plastic bag

Section 3: Lesson 2

Note: “Investigation 2I” requires direct adult supervision. An open flame is involved.

- safety goggles
- latex gloves
- matches
- a tray (about 15 cm by 20 cm)
- a gas collecting bottle
- an evaporating dish
- tongs
- a candle (10 cm tall)
- ice cubes
- aluminum foil

Section 3: Lesson 3

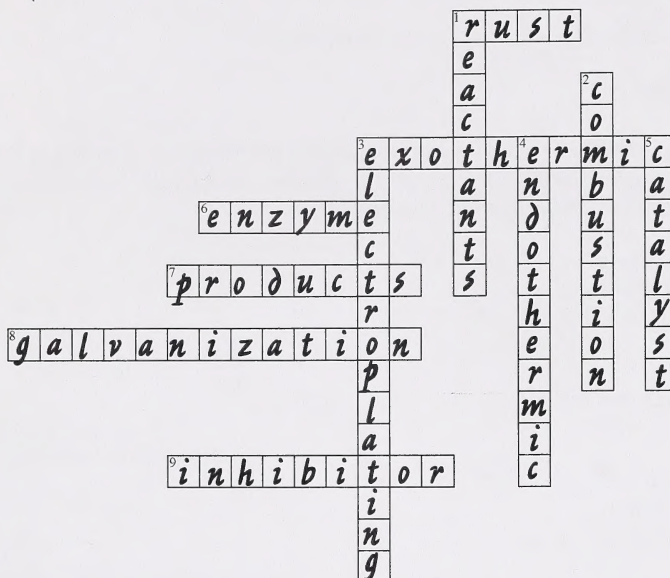
No extra materials are needed for this lesson.

Suggested Answers

Section 3: Lesson 3

Textbook questions 1, 2, 5, and 7 of “Wrap-up: Topics 7 to 8,” page 165:

1.



2. The reaction is exothermic because energy is being released.

5. The following are two possible examples:

- A chemical reaction is taking place. There is no outside heat source.
- A physical change is taking place. The added chemical was hot.

7. photosynthesis: carbon dioxide + water (+ light energy) → sugar + oxygen

respiration: sugar + oxygen → carbon dioxide + water (+ energy)

Both of these reactions involve a measurable energy change, are chemical reactions, are common, involve oxygen, have the same reaction, and are just reversed.

The following are differences:

- Only respiration is an oxidation reaction.
- Respiration is exothermic, while photosynthesis is endothermic.
- Plants and animals respire, while only plants and some micro-organisms photosynthesize.
- Reactants of one are the products of the other.

Module Review

Textbook questions 3, 8, 10, 11, 15, 24, 27, and 39 of “Unit 2 Review,” pages 170 to 173:

3. Answers will vary. Examples of pure substances are helium, table salt, fat, and pyrite.

Steel, soft drinks, hot tea beverages, and mouthwash are examples of solutions.

A mixed green salad, dirty snow, and milk are types of mechanical mixtures.
8. Factors affecting the rate of chemical reactions include concentration, temperature, agitation, the presence of catalysts or inhibitors, and the surface area in contact.
10. Observations are what one senses and measures. Scientific theories are possible explanations of observations backed up by scientific research.
11. A new substance(s) is produced in a chemical reaction. In a physical reaction, one starts and ends with the same substance(s).
15. Dalton's atomic theory refers to the different types of particles. It explains how they are formed (bonding) and interact (chemical reactions).
24. Baking soda is an ionic compound. It is a white solid that reacts with acids. It is not combustible. Sodium is a highly reactive, shiny, silver-coloured metal. Hydrogen is a combustible gas. Carbon is a black, combustible solid. Oxygen is gas that is required for respiration.
27. Note the following:
 - It has 3 elements and 9 atoms.
 - It is a molecular compound because it is made up of non-metallic elements.
 - It has a ratio of 2 carbon: 6 hydrogen: 1 oxygen.
39. Answers will vary. The understanding of atoms has promoted an organized way of investigation. Insight into atomic structure led to a modern periodic table based on atomic numbers. Periodicity of physical and chemical characteristics of elements according to the modern periodic table enables chemists to make better hypotheses and stronger theories. The insight into atomic structure supports the understanding of bonding, molecules, and chemical reactions. This understanding allows chemists to both predict and explain the properties and formulas of compounds.



ASSIGNMENT BOOKLET 2B

Science 9

Module 2: Section 3 Assignment and Final Module Assignment

Home Instructor's and Student's Comments:

STUDENT FILE NUMBER

(if label is missing or incorrect)

Date Submitted:

Apply Module Label Here

Name

Address

Postal Code

*Please verify that preprinted label is for
correct course and module.*

FOR SCHOOL USE ONLY

Assigned Teacher:

Date Assignment Received:

Grading:

Teacher's Comments

Teacher's Signature

Home Instructor: Keep this sheet when it is returned to you as a record of the student's progress.

INSTRUCTIONS FOR SUBMITTING THIS DISTANCE LEARNING ASSIGNMENT BOOKLET

When you are registered for distance learning courses, you are expected to regularly submit completed assignments for correction. Try to submit each Assignment Booklet as soon as you complete it. Do not submit more than one Assignment Booklet in one subject at the same time. Before submitting your Assignment Booklet, please check the following:

- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

MAILING

1. Do **not** enclose letters with your Assignment Booklets. **Send all letters in a separate envelope.**
2. Put your Assignment Booklet in an envelope and take it to the post office and have it weighed. Attach **sufficient postage** and seal the envelope.

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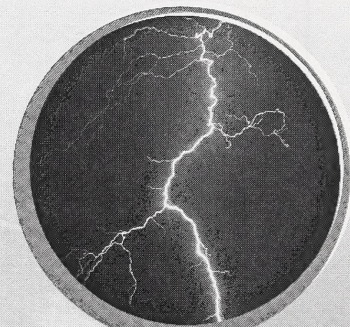
It may be possible to e-mail your completed Assignment Booklet to the school with which you are registered. Contact your teacher for the appropriate e-mail address.

SCIENCE 9

Module

2

Matter and Chemical Change *Assignment Booklet 2B*



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Summary

	Total Possible Marks	Your Mark
Section 3 Assignment	22	
Final Module Assignment	50	
	72	

Teacher's Comments

Science 9

Module 2: Matter and Chemical Change

Assignment Booklet 2B

Section 3 Assignment and Final Module Assignment

Learning Technologies Branch

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ASSIGNMENT BOOKLET 2B
SCIENCE 9: MODULE 2
SECTION 3 ASSIGNMENT AND FINAL MODULE ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments.

This Assignment Booklet is worth 72 marks out of the total 150 marks for the assignments in Module 2. The value of each assignment and each question is stated in the left margin.

Work slowly and carefully. If you have difficulty, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

22

Section 3 Assignment: Characteristics of Chemical Reactions

Read all parts of your assignment carefully and record your answers in the appropriate places.

1. Read "Investigation 2G: Hot Potato, Cold Potato" on page 151 of the textbook. This investigation involves the reaction of hydrogen peroxide with liver and potatoes. Slices of liver or slices of potato are added to 5 mL of hydrogen peroxide solution in a test tube. When the slices are added you can see a column of foam forming due to a chemical reaction. By keeping track of the temperature you can find that the reaction is exothermic.

4

- a. How would the measured mass of the reactants and the products in this investigation compare? Explain.

1

- b. If you used hydrogen peroxide to bleach your hair, would your scalp feel hotter or cooler? Explain.

- 10 2. Complete the following table using evidence you can observe or infer from the information.

Classifying Changes		
Location of Change Information	Evidence or Reason	Classification (Chemical Reaction or Physical Change)
Check station III of “Find Out Activity: Is It a Chemical Reaction?” from Section 3, Lesson 1, where sugar is stirred with water.		
Look at station IV of “Find Out Activity: Is It a Chemical Reaction?” from Section 3, Lesson 1, where a crushed, commercial antacid tablet is placed in a glass partially filled with water.		
Read “Math Connect” from page 40 of the textbook, which describes an effect that eating asparagus has on people’s urine.		
Check “Figure 2.15” from page 110 of the textbook, which shows the effect of the passage of an electric current through water.		
Look at the question 11 photo from page 115 of the textbook, which represents a bismuth trigger being activated by fire.		

①

3. Refer to "Figure 2.49" on page 148 of the textbook. It represents a reaction involving silver, bromine, and silver bromide.

Circle the letter of the best response.

The product of the reaction is

- A. bromine
- B. oxygen
- C. silver
- D. silver bromide

①

4. When vinegar and baking soda react in a flask, the flask feels quite cold. Classify the chemical reaction in the flask.

②

5. Why would a candle burn longer in the open than it would in a small, sealed glass jar?

Return to page 61 of the Student Module Booklet and continue with Lesson 2.

②

6. Describe the difference between an inhibitor and a catalyst.

①

7. The following indicate changes to the reactants of a chemical reaction.

- (1) decreasing the concentration of reactants
- (2) decreasing the size of lumps of reactants
- (3) decreasing the temperature of the reactants
- (4) stirring the reactants

Answer this question by circling the letter of the best response.

Which of these changes to the reactants would increase the rate of reaction?

- A. (1) and (2)
- B. (1), (2), and (4)
- C. (2) and (4)
- D. (3) and (4)

Return to page 68 of the Student Module Booklet and continue with the Module Summary.

50

Final Module Assignment

Read all parts of your assignment carefully and record your answers in the appropriate places.

2

1. A physical property for silicon is _____ and a chemical property is _____.

2

2. List two ways in which metals and non-metals differ.

2

3. Refer to the picture of dry ice (frozen carbon dioxide) bubbling in water on page 171 of the textbook.

Is the occurring change physical or chemical? Provide two facts to back up your classification.

4

4. Write the chemical equation, including the states, for this reaction.

Sodium chloride results from a reaction between sodium metal and chlorine gas.

4

5. Refer to the "Properties of Common Substances" table, which starts on page 442 of the textbook. List the substance or substances that are

a. gas(es) at -260°C _____

b. liquid(s) at -160°C _____

c. solid(s) at $+3600^{\circ}\text{C}$ _____

4

6. Classify the following substances as metalloids, non-metals, or metals.

a. neon _____ b. lithium _____

c. boron _____ d. phosphorus _____

6

7. Name the following compounds in the spaces right next to the compounds. Classify them as molecular or ionic in the spaces to the far right.

a. AlO _____

b. SO_3 _____

c. CaCl_2 _____

2

8. After chewing a starchy soda cracker for awhile, you notice that it tastes quite sweet. Explain this observation.

1

9. Classify chemical A according to its role in the following reaction. Note that chemical A is on both sides of the equation.

chemical A + chemical B \rightarrow chemical C + chemical D + chemical A

2

10. A solution gets warmer as a new substance is added to it. Provide two different inferences you can draw from this observation.

12

11. Refer to the "Periodic Table of the Elements" on pages 132 and 133 of the textbook. Also look at "Appendices B and C" on pages 440 to 445 of the textbook, and any other parts of the textbook that you find useful. Check these sources to find answers to the following questions.

a. the melting point of fluorine _____

b. boron's state at room temperature _____

c. cobalt's group _____

d. the number of neutrons in an atom of argon _____

e. the density of silver _____

f. the chemical symbol for antimony _____

g. the chemical formula for fluorine _____



- h. the period of cesium _____
- i. the atomic mass of rubidium _____
- j. radium's specific chemical family _____
- k. helium's specific chemical family _____
- l. Is arsenic a metal, a non-metal, or a metalloid? _____

12. Carbon dioxide, water, carbon particulates, and carbon monoxide are released into the air as methane burns.

①

- a. What is the reactant(s)?

②

- b. How would the total number of atoms in the reactant(s) compare to the total number of atoms in the products? Explain.

①

- c. What type of reaction is taking place?

②

13. What person's atomic model was the first to include both negatively and positively charged particles?

①

14. a. What safety procedure can you infer from an icon found on a parcel that contains a caustic liquid? Explain.



①

- b. What safety procedure can you infer from an icon found on a metal cylinder? Explain.



①

- c. What safety procedure can you infer from an icon found on a metal tank? Explain.



Submit your completed Assignment Booklet 2B to your teacher for assessment.

ASSIGNMENT BOOKLET DECLARATIONS

The school you are registered with may require you to submit this signed form with your Assignment Booklet.

The Student's Declaration is to be signed by the student. If the student is under 16, the Supervisor's Declaration may need to be signed by the supervisor, who is usually a home instructor, teacher, or home-schooling coordinator. Failure to complete this page may invalidate the assignment results. Please contact your school and ask if this completed form is required.

STUDENT'S DECLARATION

- I have followed the instructions outlined in the Student Module Booklet.
- I have completed the activities to prepare myself for the assignments in this Assignment Booklet.
- I completed the assignments in this Assignment Booklet by myself.

Student's Signature

SUPERVISOR'S DECLARATION

I hereby certify that I have supervised the learning activities completed by _____.
Student's Name

I also certify that to the best of my knowledge the assignments in this Assignment Booklet were completed independently by this student.

Supervisor's Signature

If you, the student or supervisor, have any comments or observations regarding this module, write them in the following space.
